

CLAIMS

Claimed is:

1. A degasser for molten metal comprising:
a microporous plate comprising a first internal passageway and a second internal
passageway;
a first nonporous interface tube attached to said microporous plate in flow
communication with said first internal passageway and a second nonporous
interface tube in flow communication with said second internal passageway.
2. The degasser of claim 1 wherein said first nonporous interface tube introduces
an inert gas to said first internal passageway.
3. The degasser of claim 1 wherein said second internal passageway and said first
internal passageway form a cavity.
4. The degasser of claim 1 wherein said microporous plate has a critical
metallostatic pressure (H_p) for penetration by aluminum at a predetermined
operating depth defined by the equation:

$$H_p > 4 \gamma_{is} (\cos \theta) / g \rho \phi$$

wherein:

γ_{is} is interfacial surface energy between said microporous plate and said
metal,

θ is contact wetting angle of molten metal on said microporous plate,

g is Newton's constant,

ρ is the liquid metal density and

ϕ is the pore opening size of said microporous plate.

5. The degasser of claim 1 wherein said microporous plate comprises passages.
6. The degasser of claim 1 wherein said passages have an equivalent diameter of at
least about 500 microns to no larger than about 50 mm.
7. The degasser of claim 6 wherein said passages have an equivalent diameter of at
least about 5 mm to no more than about 7.5 mm.
8. The degasser of claim 5 wherein said passages are separated by a distance
between about 0.5 to 10 times an equivalent diameter of said passage.
9. The degasser of claim 1 wherein said microporous plate is about 3 mm to about
200 mm thick.
10. The degasser of claim 1 further comprising a containment vessel with said
microporous plate contained in said containment vessel.

11. The degasser of claim 10 further comprising a filter in said containment vessel.
12. The degasser of claim 1 further comprising a monitor in flow communication with said first interface tube for monitoring gases flowing therethrough.
13. A method for purifying molten metal comprising the steps of:
5 melting metal to form molten metal;
passing said molten metal through a containment vessel wherein said containment vessel comprises a degasser and wherein said degasser comprises a microporous plate comprising at least one internal passageway and a nonporous interface tube attached to said microporous
10 plate in flow communication with said internal passageway;
passing a purge gas into said microporous plate; and
removing hydrogen from said microporous plate through said interface tube.
14. The method for purifying metal of claim 13 wherein said containment vessel further comprises a filter.
15. The method for purifying metal of claim 14 wherein said metal passes through said microporous plate prior to passing through said filter.
16. The method for purifying metal of claim 13 wherein said microporous plate has a critical metallostatic pressure (H_p) defined by the equation:

$$H_p > 4 \gamma_{is} (\cos \theta) / g \rho \phi$$

wherein:

H_p is critical pressure for capillary penetration,

γ_{is} is interfacial surface energy between said microporous plate and said metal,

θ is contact wetting angle of molten metal on said microporous plate,

g is Newton's constant,

ρ is the liquid metal density and

ϕ is the pore opening size of said microporous plate.

17. The method of claim 13 wherein said hydrogen is removed by vacuum applied to said interface tube.
18. The method of claim 13 wherein said hydrogen is removed by flowing a purge gas through said degasser.
19. The method of claim 13 wherein said microporous plate comprises passages.
20. The method of claim 19 wherein said passages have an equivalent diameter of at least about 500 microns to no larger than about 50 mm.

21. The method of claim 20 wherein said passages have an equivalent diameter of at least about 5 mm to no more than about 7.5 mm.
22. The method of claim 19 wherein said passages are separated by a distance between about 0.5 to 10 times an equivalent diameter of said passage.
- 5 23. The method of claim 13 wherein said microporous plate is about 3 mm to about 200 mm thick.
24. The method of claim 13 wherein said degasser further comprising a monitor in flow communication with said interface tube for monitoring gases flowing therethrough.
- 10 25. An apparatus for purifying molten metal comprising:
a containment vessel comprising an inlet throat and an outlet throat; and
a degasser between said inlet throat and said outlet throat wherein said degasser comprises a microporous plate comprising at least one internal passageway and
15 at least two nonporous interface tubes attached to said microporous plate in flow communication with said internal passageway.
26. The apparatus for purifying metal of claim 25 further comprising a filter.
27. The apparatus for purifying metal of claim 26 wherein said filter is between said degasser and said outlet throat.
28. The apparatus for purifying metal of claim 26 further comprising an equalization
20 space between said degasser and said filter.
29. The apparatus of claim 25 wherein said outlet throat comprises a first transition region comprising a downward sloping floor and a drain in said floor.
30. The apparatus of claim 29 wherein said outlet throat further comprises a second transition region comprising an upward sloping floor.
- 25 31. The apparatus of claim 24 further comprising a monitor in flow communication with an interface tube for monitoring gases flowing therethrough.